

SCI-ARC

# JACOB LEHRER

26

## PORTFOLIO

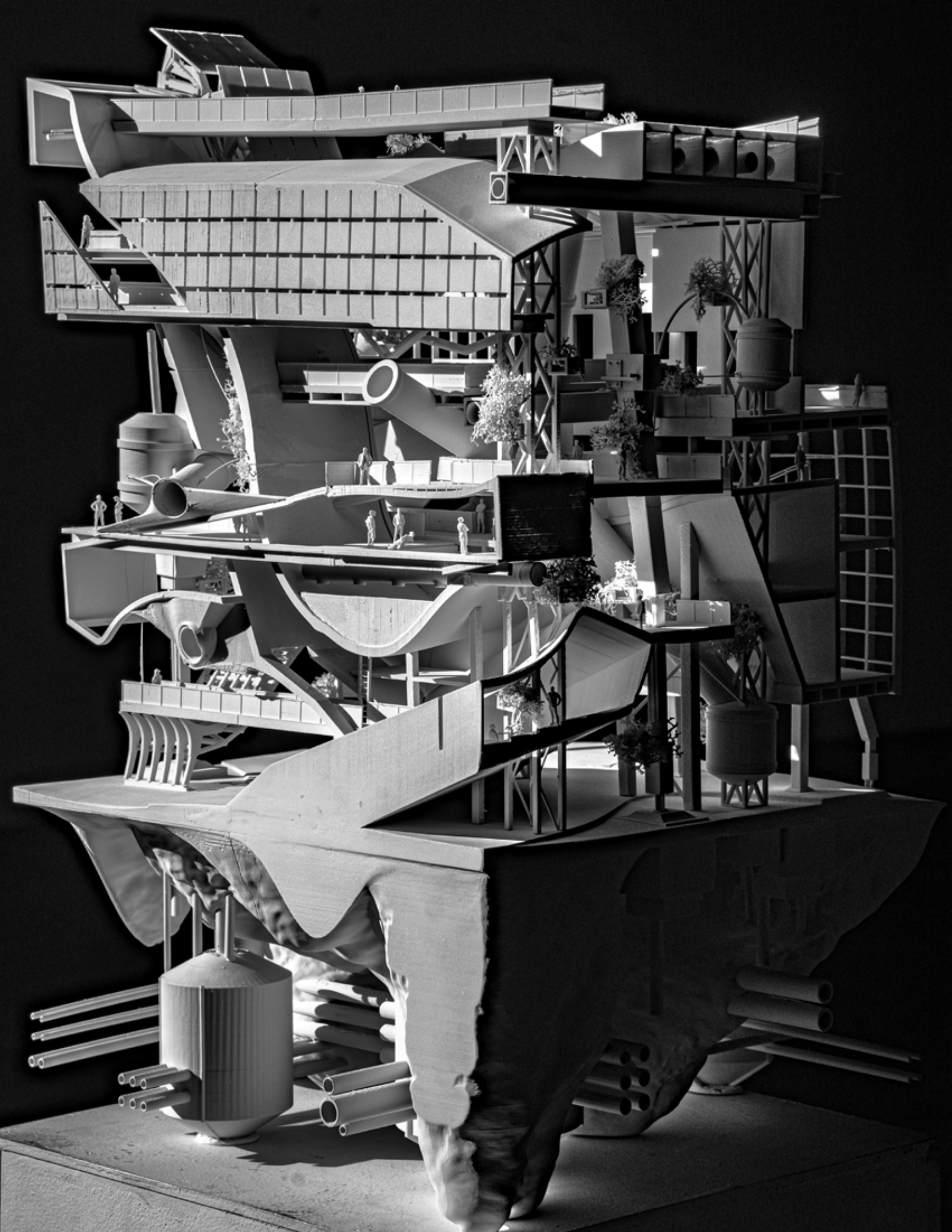


# Lincoln Heights Jail

## Design Partner - Jonathan Kadau

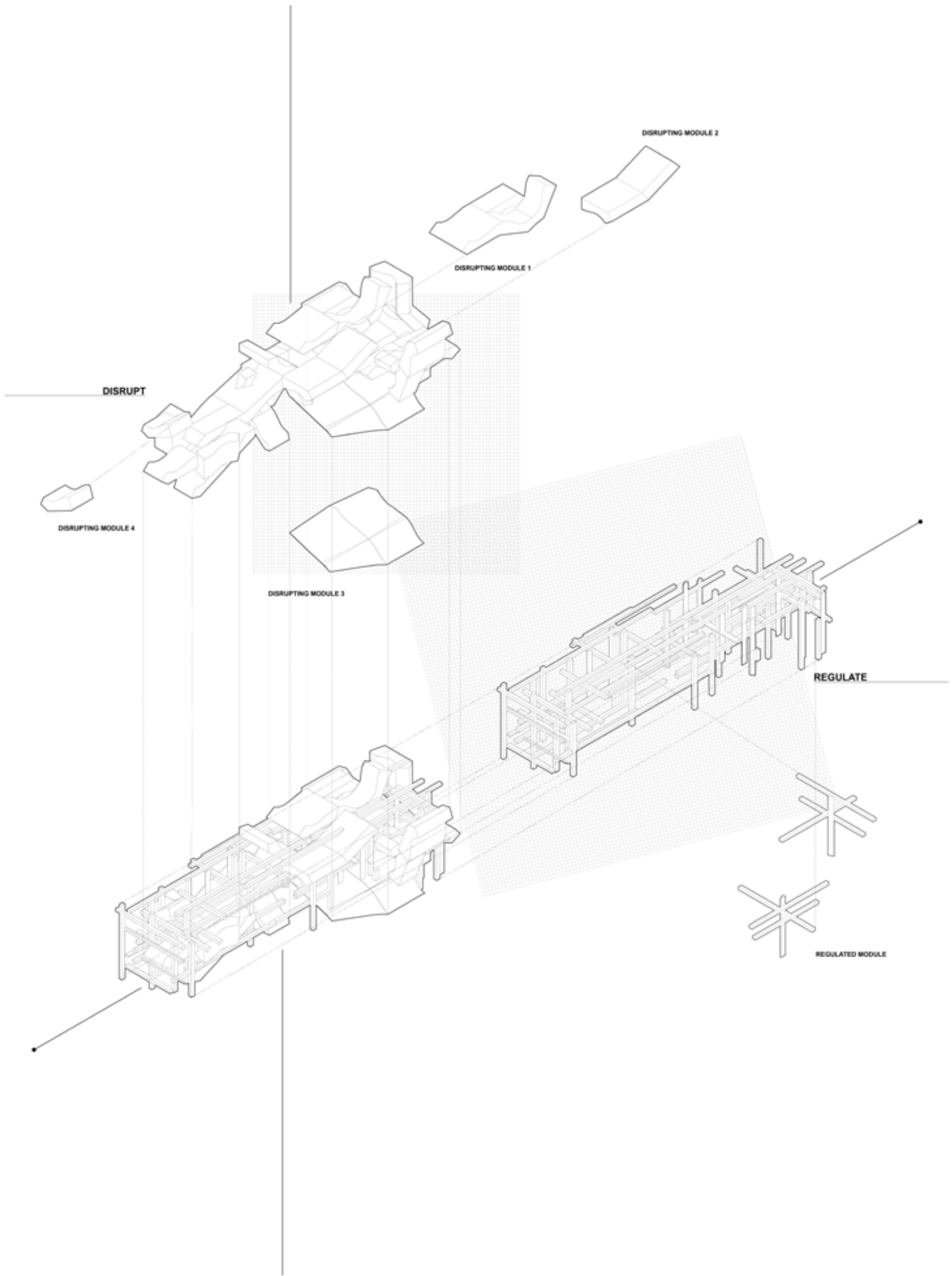
Professor: Jenny Wu

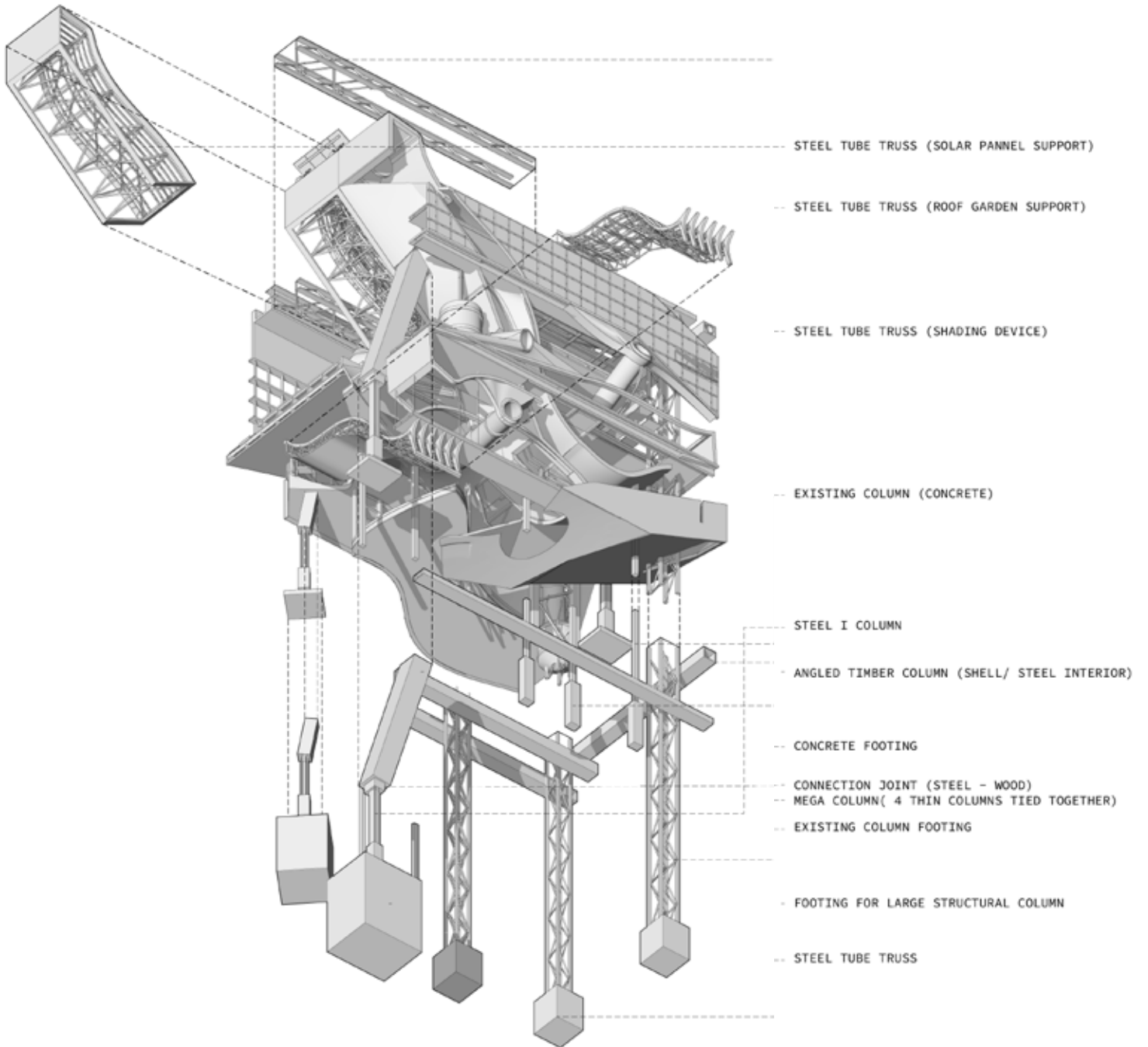
Transforming the former Lincoln Heights Jail into a porous metabolic engine, this project utilizes net-zero infrastructure as its primary aesthetic driver. The architecture rejects hidden mechanical systems, instead exploding a new steel-timber hybrid structure off the original concrete frame to celebrate its own visible infrastructure. By lifting the massing to scoop air from the Los Angeles River, the design creates a naturally ventilated core that shifts circulation to the exterior, slashing the conditioned floor area by nearly 100,000 square feet. The ground floor is then turned into an open air street market inspired by the local Avenue 26 night market that closed in 2021. The envelope is reimagined as an active, occupiable skin where solar panels and mechanical systems replace traditional finishes to harvest both light and thermal energy. The formal result is a relentless synthesis of performance and tectonic expression. It is an autonomous civic ecosystem where the machine and the garden function as a singular, regenerative apparatus.

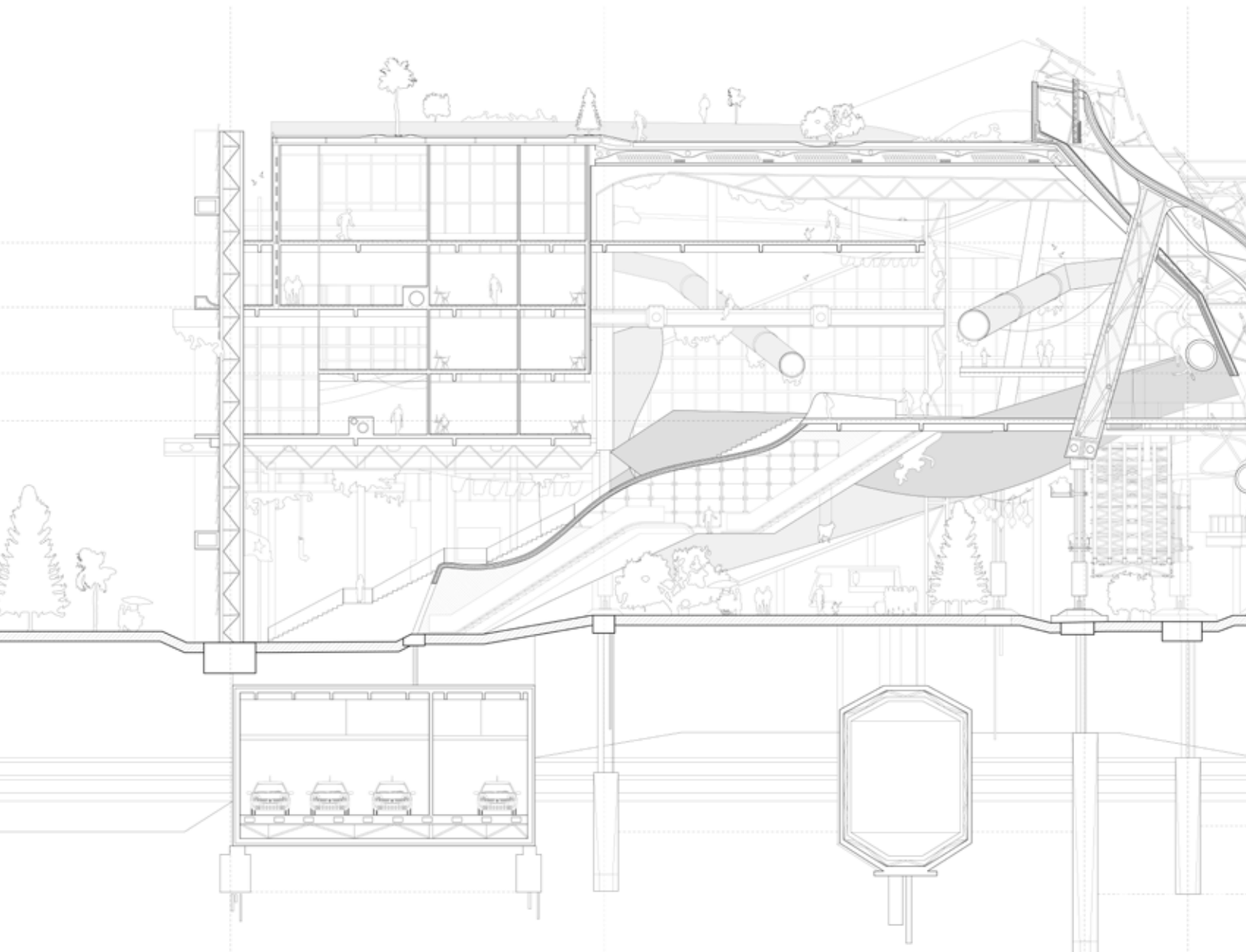


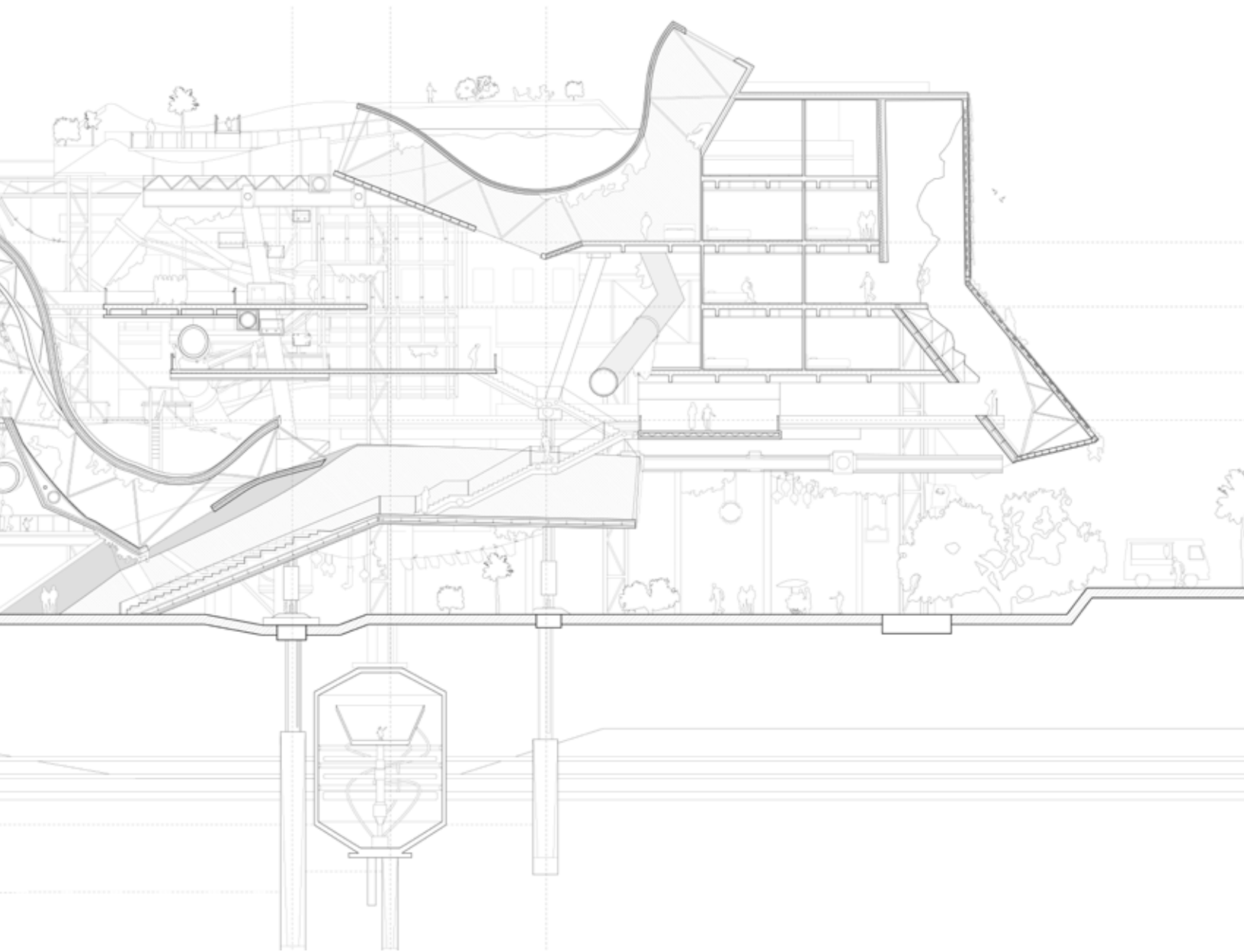


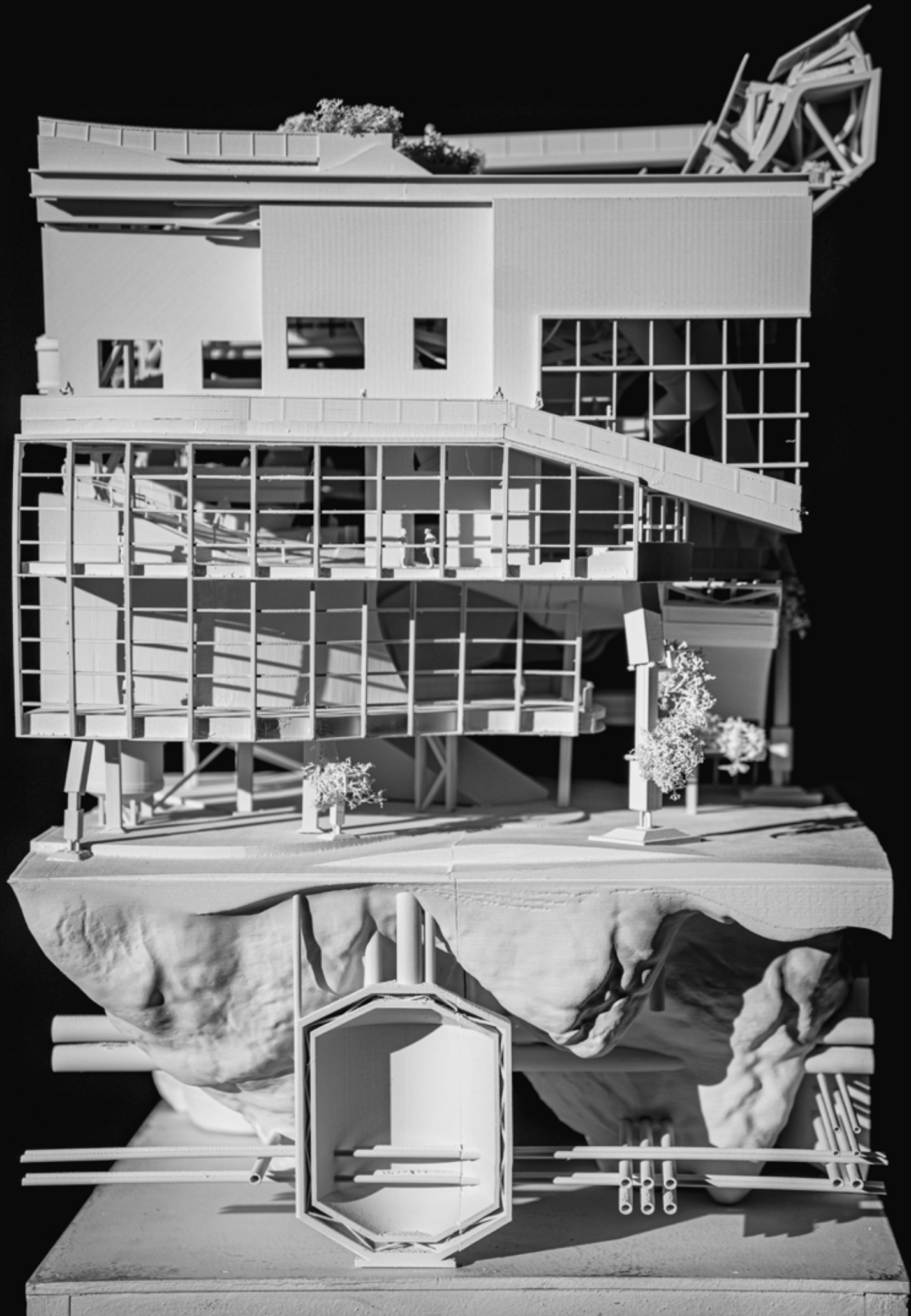












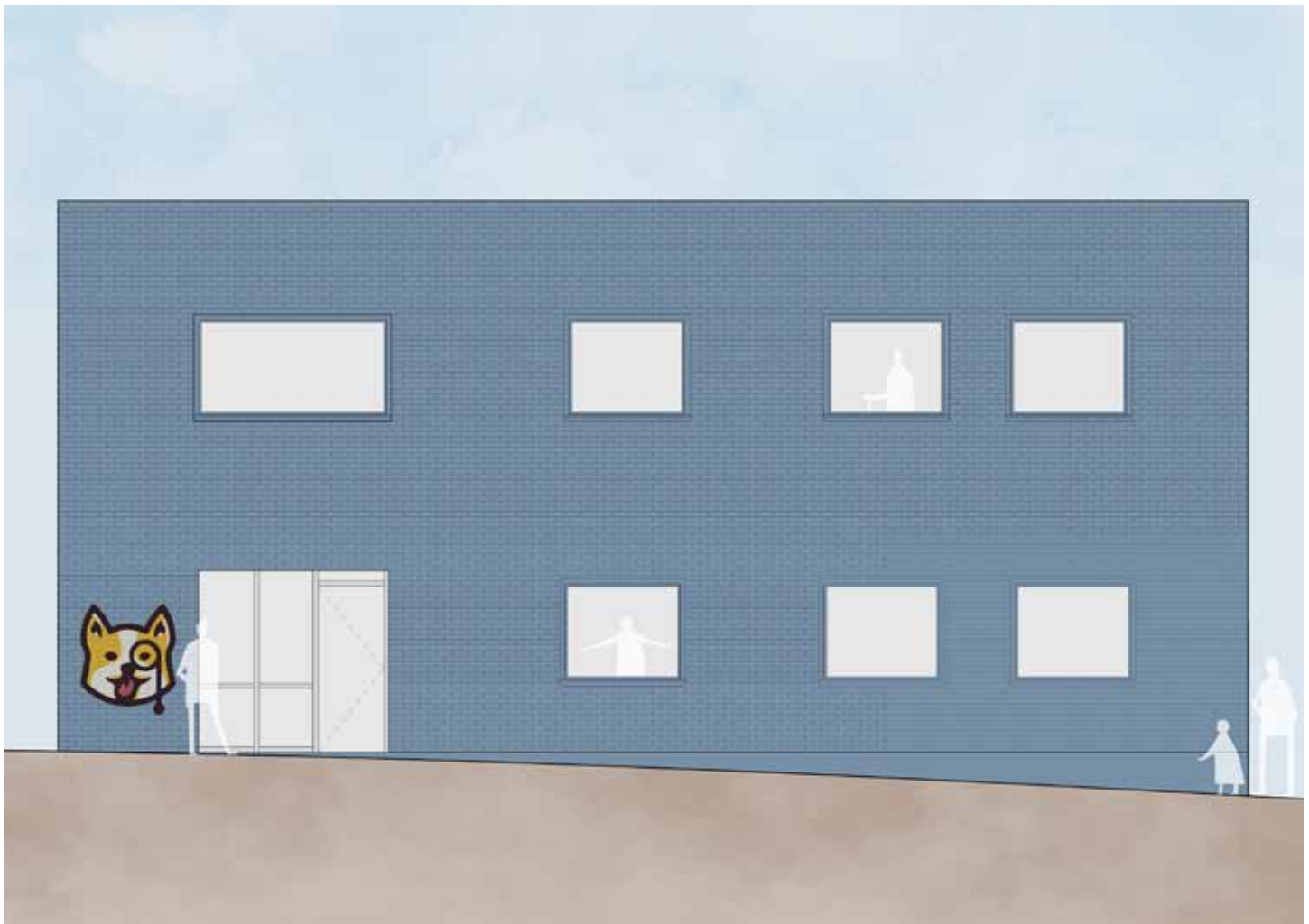


# Computer Vision & AI Trained Agentic Behavior Simulation

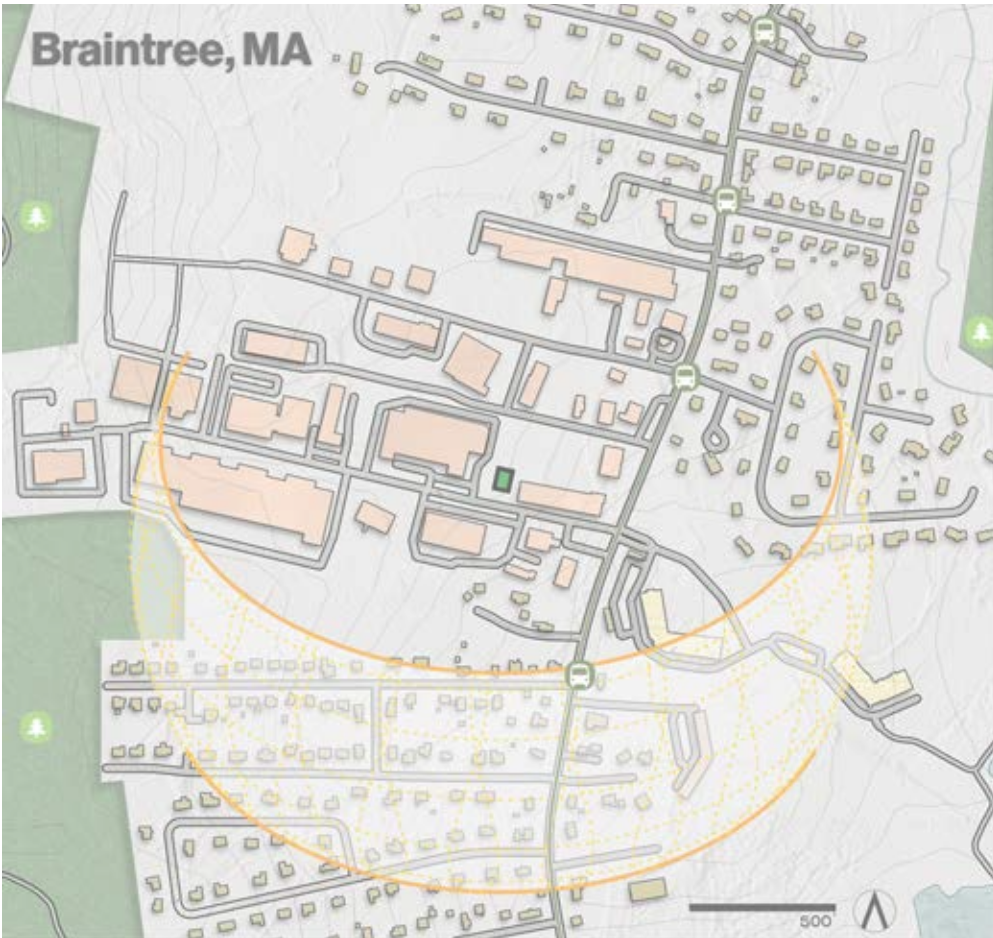
*Braintree, MA, 2026 (In Construction)*

When tasked to design a doggy daycare, we focused on two questions. How can we design using natural materials, and with a new user typology, how can we get real data to understand behavior patterns? Through this process, we investigated local materials that can reduce noise, smells, and sounds. I also developed the Sentient Environment Engine. This system uses Computer Vision to train an Agent Based Model using Bayesian Optimization to help us better understand behavior patterns in dog daycare spaces. I am currently working to expand this system with more complex users and locations.

Design Lead, R&D Lead: Jacob Lehrer  
Interior Designer: Jennifer Medina  
Architect of Record: SHED Architects  
MEP: Design Learned, Inc.  
Contractor: Vantage Builders



Front Elevation



Surrounding Context

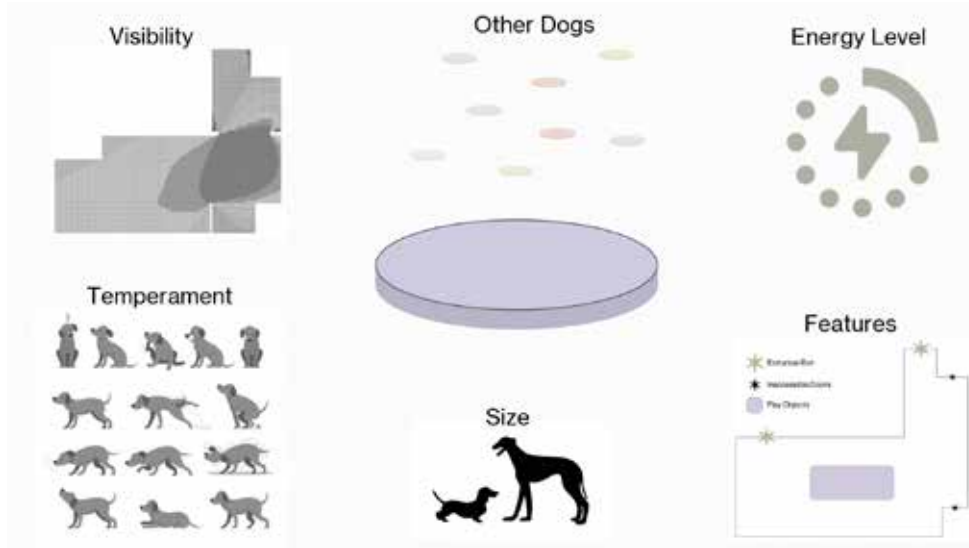
Outdoor Playspace Addition





# How Do Dogs Move?

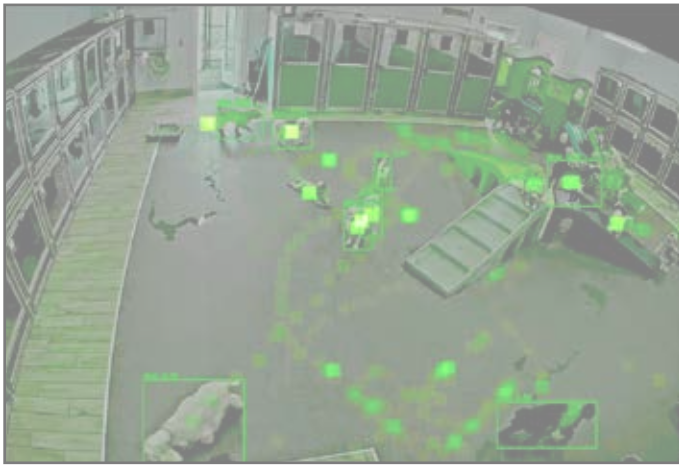
I developed a custom python system to simulate dogs randomly walking around an enclosed space to understand this unique user typology. By simulating the space digitally using real data, we are better able to adapt to the dog's true movement and reactions to space, allowing my client to earn an 80% increase in permitted capacity from the Braintree Planning Department. The concept is to create a basic simulant for dog behavior, analyze real dogs using computer vision, then train the simulation on the real data. This algorithm gets better every day, leading to an eventual goal of having this system running live in the operating daycare to provide real-time insights into the behavioral patterns of the dogs in my client's care. Then, in future franchises, we can customize layouts to the specific dogs in the area.



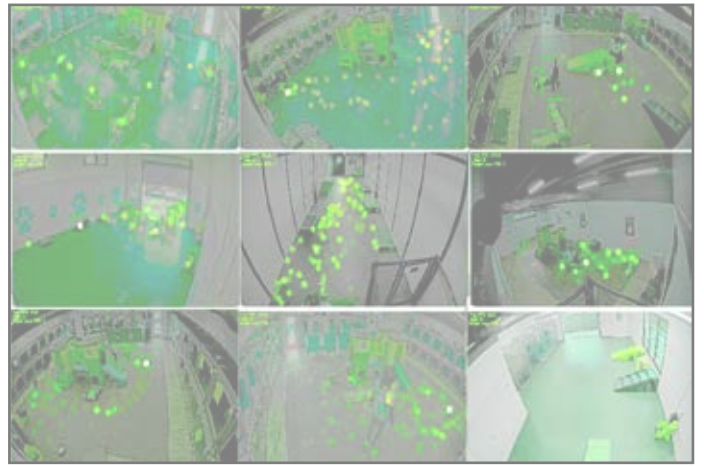
## Simulation Factors



Final Simulation Pass for Planning Board

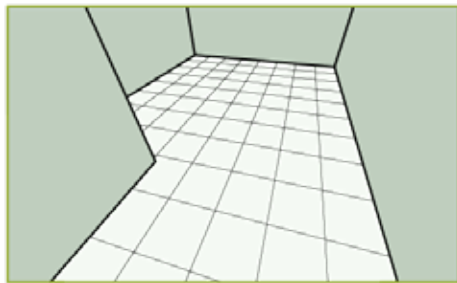


Single Location

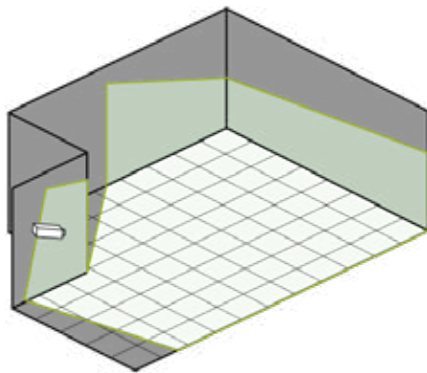


Nine Locations Simultaneously

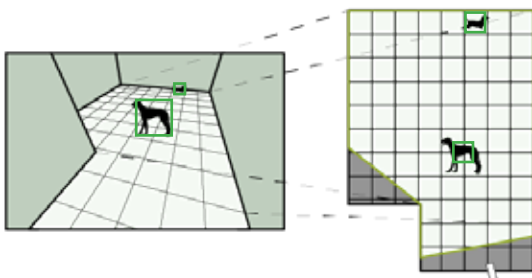
### Real-Time Tracking



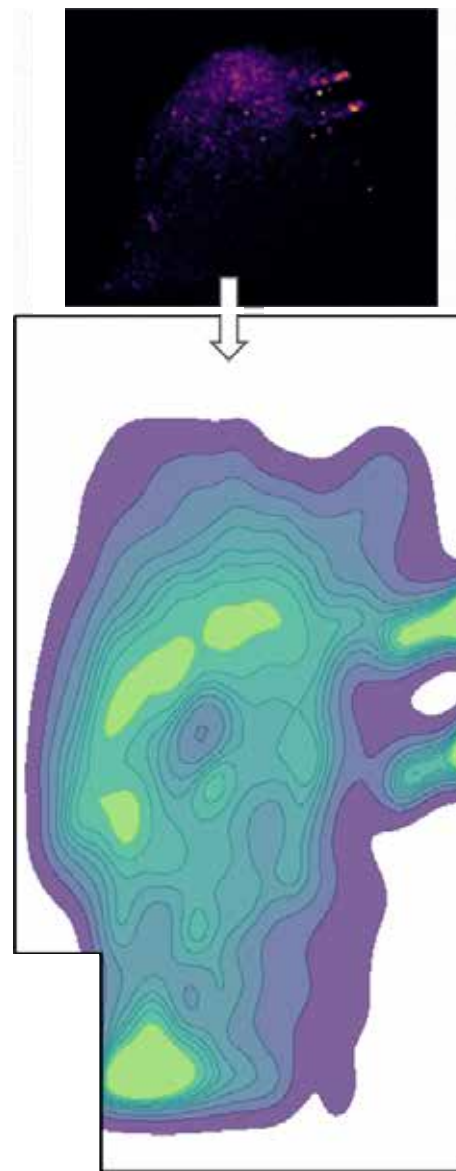
Grab Angled Camera View



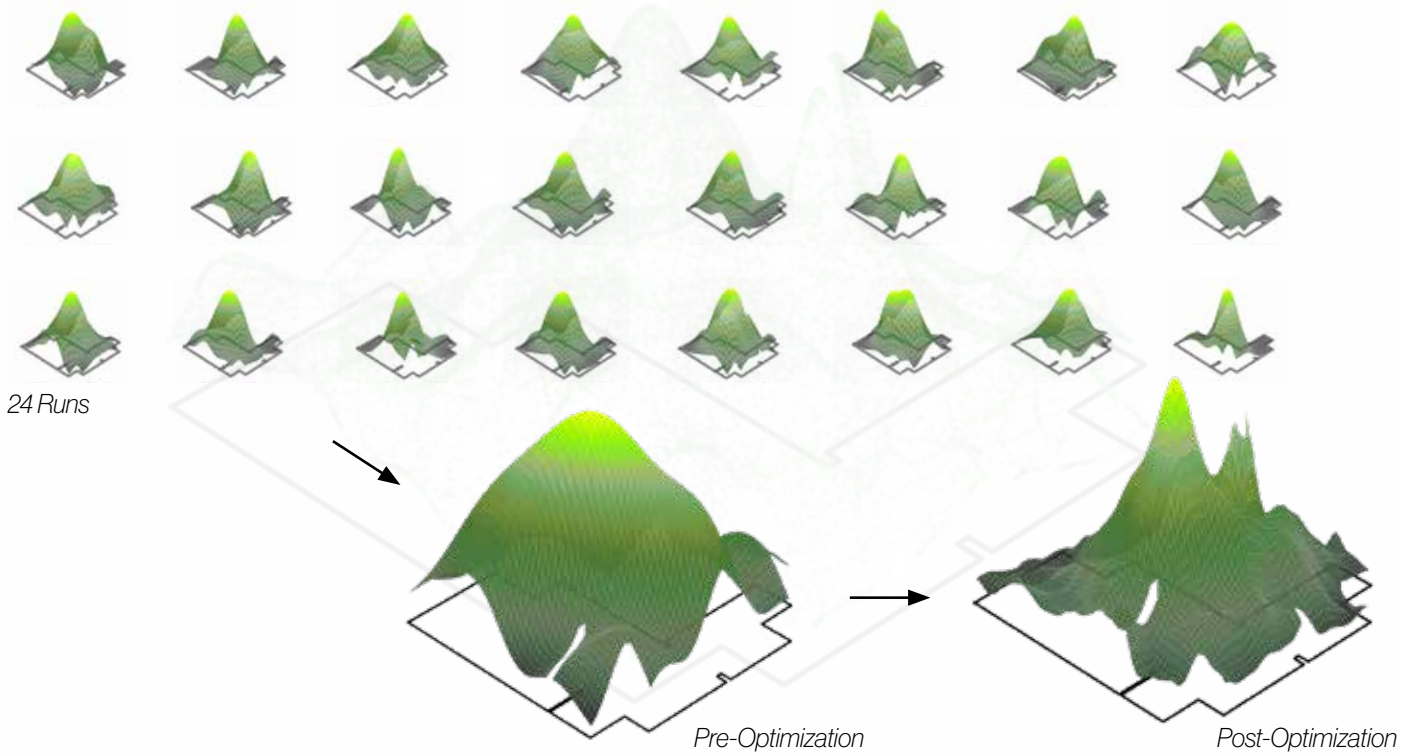
Approximate Plan and Camera in 3D Space



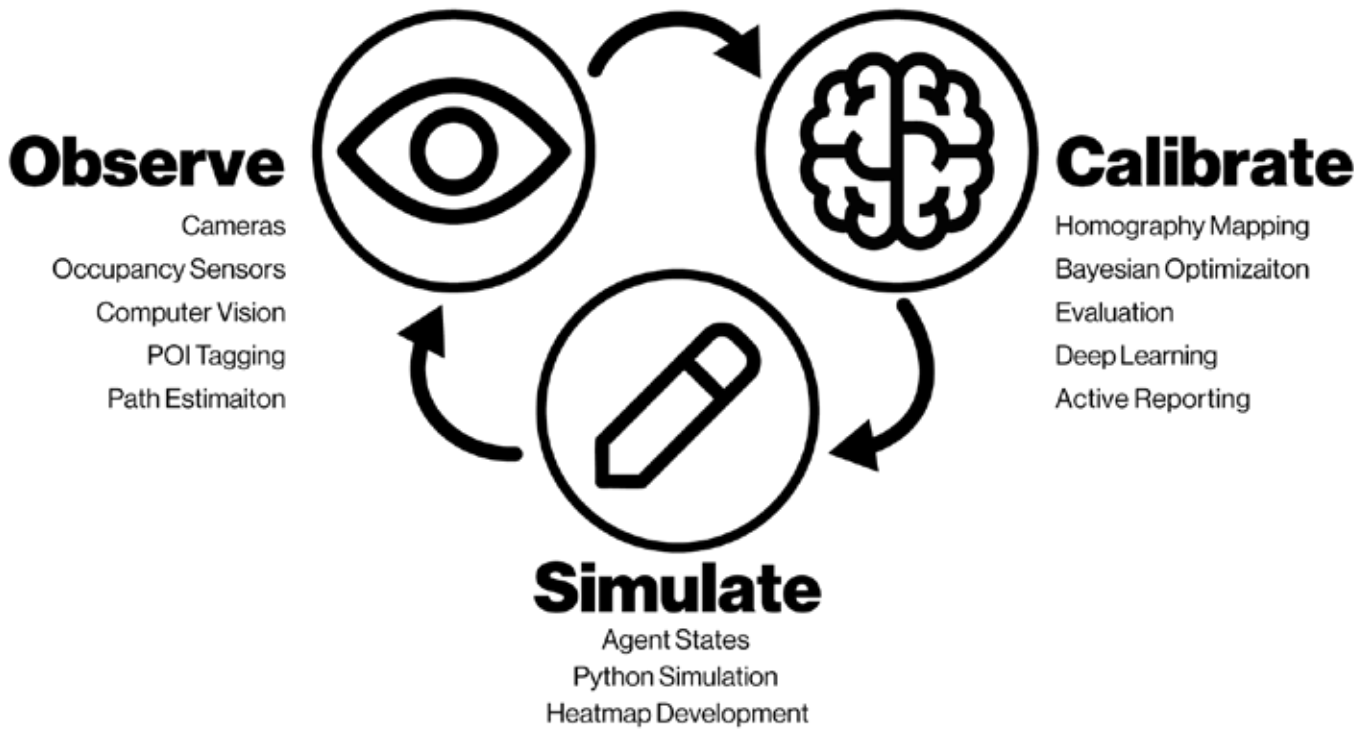
Apply Homography Algorithm for 2D Tracking



7/12/25 Ballantyne Playroom 8am-6pm



### AI Calibration and Aggregation



Presented at Design Tech Talk 6 by Parametric Architecture



Presented at Gateway Office at Boston Arch. College



In Preparation for Submission to ACADIA 2026

# Thallus Pavilion

*ARCH 7800-03, 2023*

Based on the Thallus Patern by ZHA CODE, We developed a system to print clay using robotics and simulate multiple curves at a time on a complex surface using Grasshopper and Maya. Separate panels are simulated based on the height of the panels to reduce weight on the roof and increase density on the base by adding or removing initial curves.

Simulation, Slicing, Rendering: Jacob Lehrer  
Surface Modeling: Dante Egizi  
Maintenance Tech: Coleman Connor  
Printing Assistant: Skylar Chardon

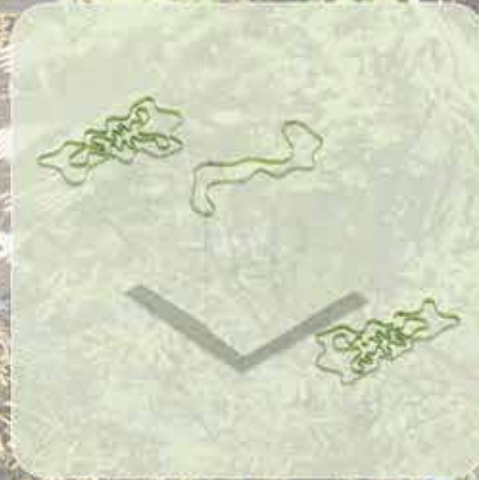




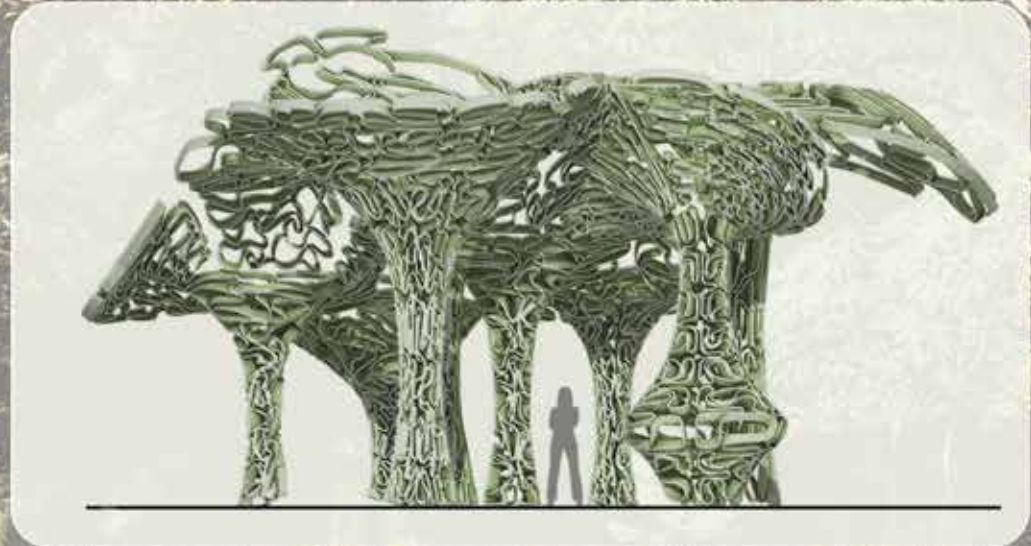
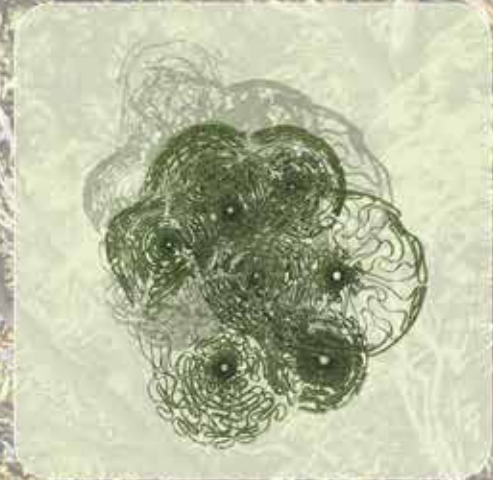
SECTION



ALPHAVIEW



SCALE BAR / 1.000000 METER



ELEVATION



ALPHAVIEW



ALPHAVIEW



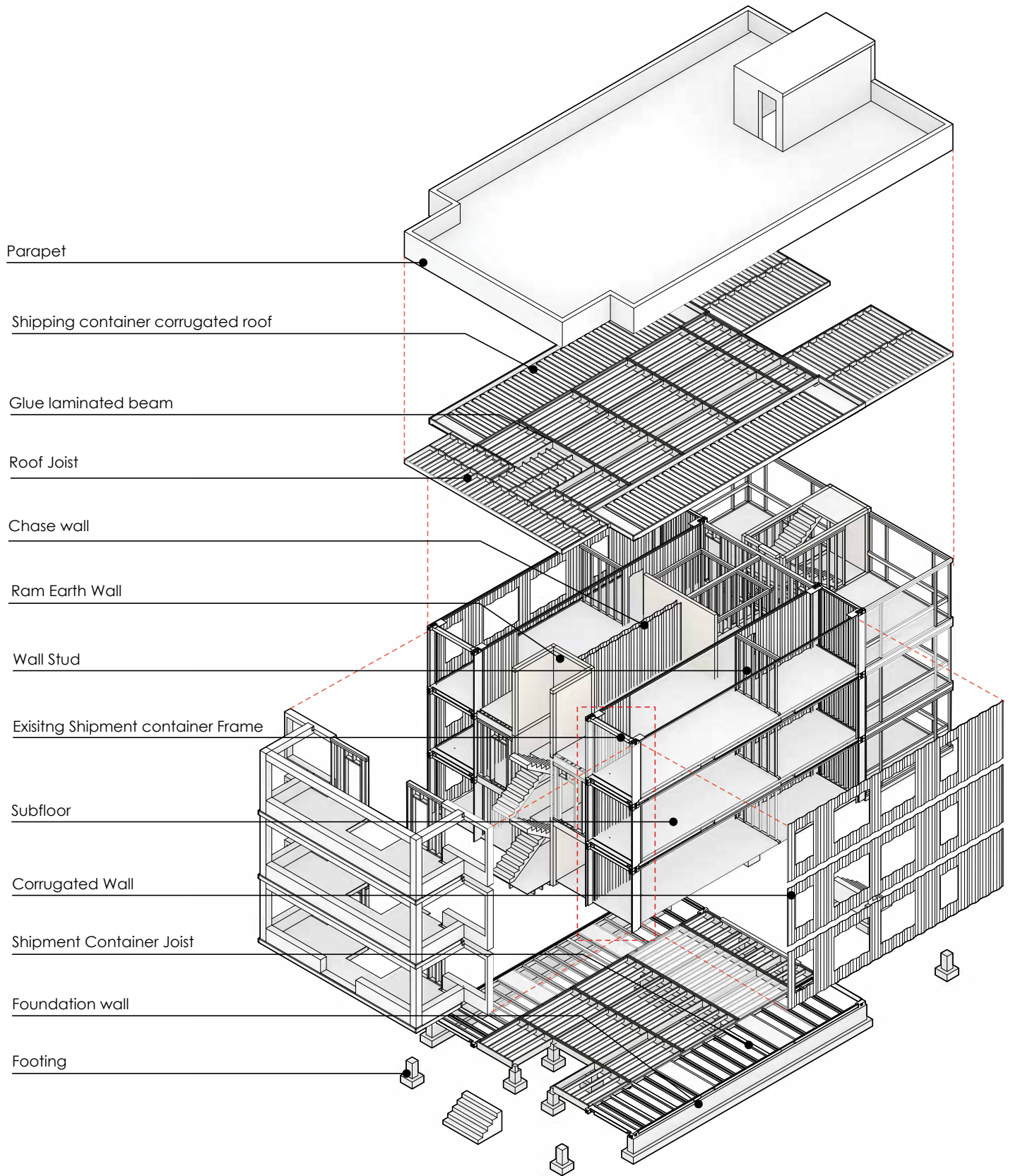
# Solar Decathlon

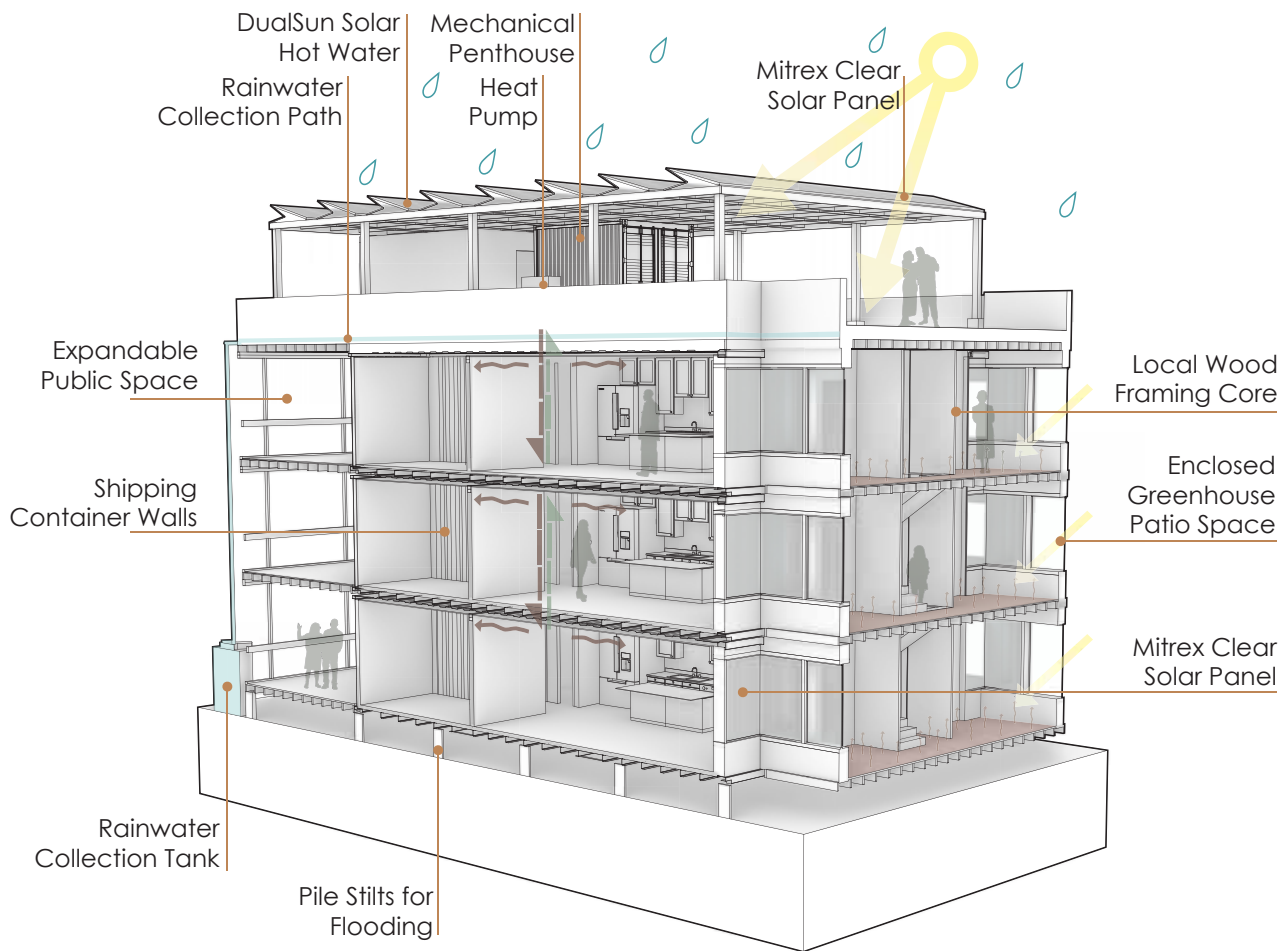
## *Attached Housing, 2023 (Finalist)*

Boston has some of the most expensive housing in the country, so our challenge for the 2023 Solar Decathlon was to build an affordable, sustainable multi-family housing project. Our solution used shipping containers from the nearby port to accentuate reuse and reduction of virgin material extraction. The key systems strategy was to separate airchanges from heating and cooling, using Energy Recovery Ventilators and Heat Pumps. We also used a solar pavillion on the roof to offset electricity use.

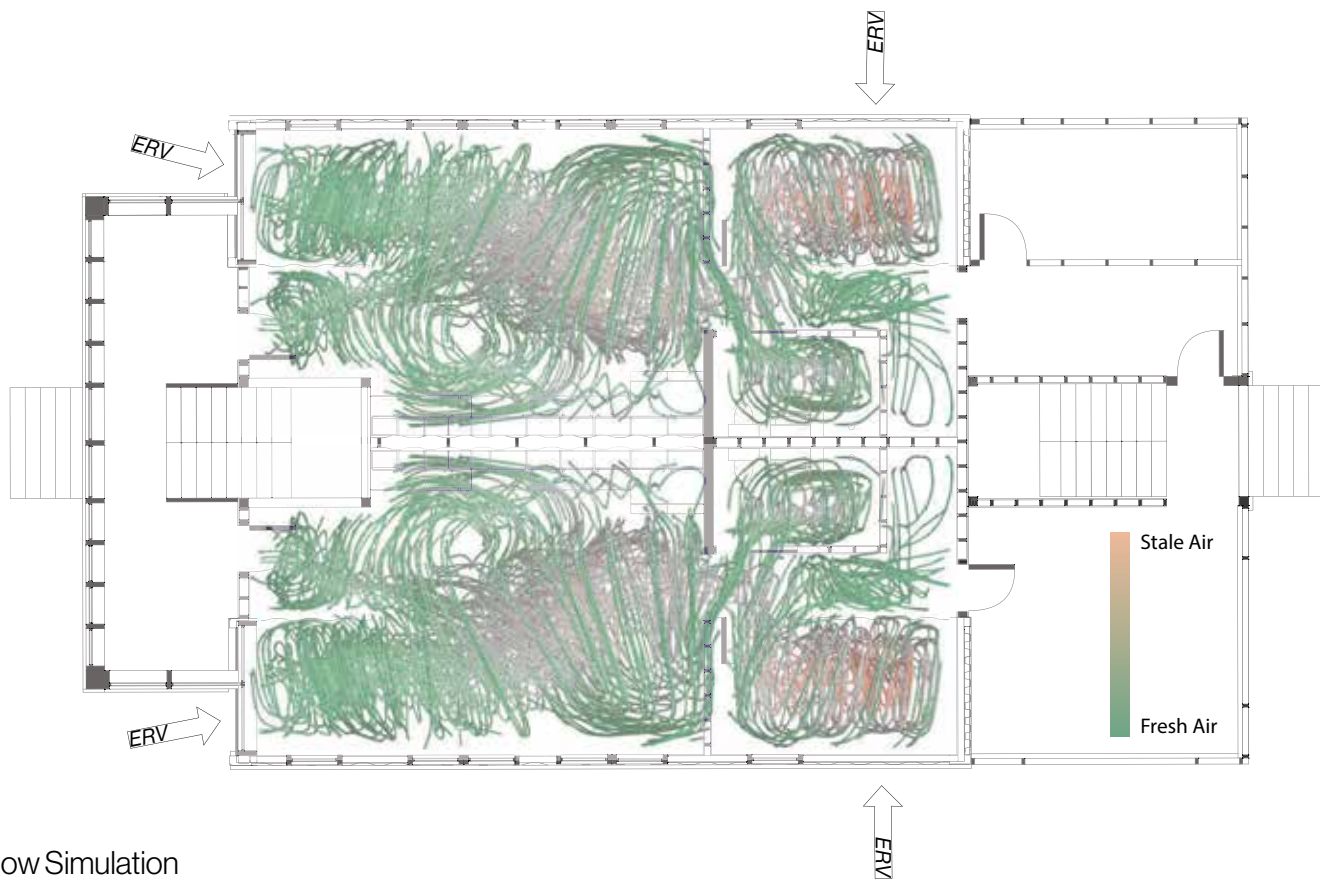
Concept + Team Lead: Antoni Kareklas  
Sustainability, Systems, Simulations: Jacob Lehrer  
Structure: Nanh Trinh  
Interiors: Madison Goldfarb  
Exterior + Graphics: Jenna Gormley







System Diagram



Airflow Simulation

# Parametric Architecture

## 2024 - Present

Since presenting AUTOMATA at CDNEXT 15, I have worked to produce two workshops, a chapter in their publication Future[Tectonics], and presented the Sentient Environment Engine at the Design Tech Talk 6.0. Expanding my own pedagogical practice has allowed me to better understand the tools I use. For example, through teaching Ladybug, I discussed the ethical implications of AI and the mathematical frameworks behind systems like ChatGPT.



PAACADEMY Page



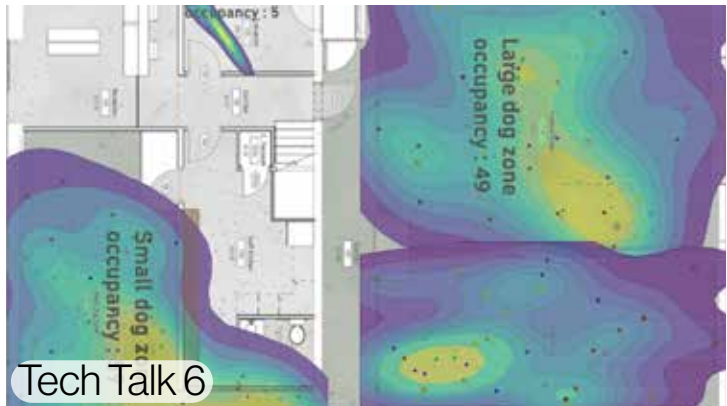
Future[Tectonics]



Plugins 101



Beginner Bundle



Tech Talk 6



Env. React. Comp.